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[Project Reports](#)  
[Award Functions](#)  
[Manage Financials](#)  
[Program Income Reporting](#)  
[Grantee Cash Management Section Contacts](#)  
[Administration](#)  
[Lookup NSF ID](#)

## Preview of Award 1834687 - Annual Project Report

[Cover](#) |  
[Accomplishments](#) |  
[Products](#) |  
[Participants/Organizations](#) |  
[Impacts](#) |  
[Changes/Problems](#)

### Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1834687
Project Title:	Collaborative Research: Prices, Peers, and Perceptions: Field Experiments on Technology Adoption in the Context of Improved Cookstoves
PD/PI Name:	Katherine L Dickinson, Principal Investigator
Recipient Organization:	University of Colorado at Denver
Project/Grant Period:	05/01/2018 - 08/31/2019
Reporting Period:	09/01/2017 - 08/31/2018
Submitting Official (if other than PD\PI):	Katherine L Dickinson Principal Investigator
Submission Date:	08/31/2018
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Katherine L Dickinson

### Accomplishments

#### \* What are the major goals of the project?

This project seeks to understand how economic incentives ("prices"), social learning ("peers"), and subjective beliefs ("perceptions") interact to influence technology adoption dynamics. We refer to our project as the P3 Project. We are conducting field experiments in the Kassena-Nankana Districts of Northern Ghana that offer improved cookstoves at different price levels to groups of households with and without social ties to households that have already received stoves during a prior study. Our specific goals are:

1. Obtain human subjects approval for study activities from participating institutions
2. Select improved stove models to be used in the intervention

3. Conduct formative research measuring willingness to pay for improved stoves in order to set range of price levels for intervention
4. Select study sample consisting of peer and non-peer group clusters
5. Conduct baseline survey with all study households
6. Make stove offers to households
7. Order and deliver stoves to households
8. Conduct follow up survey and instrument-based measurements of stove use and performance
9. Analyze study results
10. Disseminate results via peer-reviewed publications, websites, conferences, and community meetings

The core NSF-funded study builds on our team's prior work in the rural areas of the Kassena-Nankana Districts, and centers on improved biomass stove technologies that are most appropriate for this rural population. In Jun '16, we obtained funding to add a project component involving liquefied petroleum gas (LPG) stove/fuel packages in the urban areas of the district. We refer to the two arms of the project as P3 Bio (rural areas) and P3 Gas (urban areas). Given the synergies and overlap between these projects, we report progress on both arms here.

**\* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

1. P3 Bio Stove Deliveries

In Year 2, improved biomass stove offers were made to participating rural (P3 Bio) homes. These stoves were then ordered from their manufacturers (in Lesotho and India), and imported into Ghana. These stoves were distributed between October 2 and November 2, 2017. A total of 470 stoves (254 ACE and 216 Jumbo stoves) were distributed to 257 homes.

2. P3 Bio Payment Collections

At the time of delivery, an initial deposit was collected, with the remainder of payments due over the six months following delivery. All P3 Bio payment collections were completed by August of 2018.

3. P3 Gas Stove Orders

The implementing partner, ORGIIS, held community outreach meetings with urban (P3 Gas) homes, and then visited households individually to conduct one-on-one Becker-DeGroot-Marshak (BDM) auction. Briefly, these auctions involved describing a set of six liquefied petroleum gas (LPG) stove and fuel package options, collecting bids on each package, and then randomly drawing one package and an offer price to determine whether or not the household "won" and purchased a package, or not. A total of 262 auctions were conducted; 182 households won and purchased a stove/fuel package, while 80 households did not win the auction and did not purchase a package.

4. P3 Gas Stove Deliveries

The P3 Gas sample consists of households in 12 urban clusters. For stove offers and distributions, these clusters were divided into 3 sets of 4 clusters each. After stove orders were completed in each cluster, the implementers ordered package components (stoves, LPG cylinders, and other accessories) from local businesses, and then distributed them to households. Set 1 distributions were completed in January 2018; Set 2 in April; and Set 3 in May.

## 5. P3 Gas Payment Collections

Similarly to in the P3 Bio arm, P3 Gas households made an initial deposit for their packages at the time of delivery, and then were required to pay the remainder of their package price over the following six months. For Set 1 households, final payments were due on July 31, 2018. Set 2's final payments will be due Oct 31, and Set 3 Nov 30.

## 6. P3 Gas Fuel Voucher Refills

All P3 Gas packages included 4 vouchers that could be redeemed at the local LPG refilling station for a refilled cylinder. The refilling station tracked voucher usage and submitted periodic reports to the Navrongo Health Research Centre for reimbursement.

## 7. Emissions Measurements

In-home stove testing was carried out in several P3 Gas households during normal evening meal preparation. These tests quantify direct emissions from stoves used by participants as well as measure stove efficiency, building upon stove emission data previously collected in the KN districts. In addition to residential sources of air pollution, several community-scale emission sources (e.g. commercial cooking, trash burning, bush burning) were sampled to better understand exposure attributable to sources beyond the home. Analysis of these data are ongoing with journal papers in preparation.

## 8. Stove Use Monitoring

Year 2 included the installation of nearly 500 electronic loggers on stoves and the ongoing monitoring of stove usage in a subset of (56 P3 Bio and 55 P3 Gas) study households. Our team is monitoring all stoves in each sample household to fully understand stove usage and adoption/disadoption trends over time. An accompanying survey (SUMS Survey) was developed and launched in an electronic form.

## 9. Personal Exposure and Kitchen Area Air Quality Monitoring

A subset of 80 households that received SUMS, divided equally between the Bio and Gas arms, were enrolled in personal exposure and kitchen area air quality sampling. Each Bio household was visited 3-4 times over the past year where a 48-hour air quality deployment took place. The primary cook's (and if present, child's) personal exposure to CO and PM2.5 were measured as well as proximity to cooking area stoves. Kitchen area pollution monitors were rotated among these deployment households measuring CO, CO2 and PM2.5 concentrations. Analogous measurements were started in May 2018 for P3 Gas households and are ongoing. Data collected from these deployments are being processed and analysed.

## 10. Ethical Clearance Maintained and Updated

This study's protocols have been reviewed and approved by the University of Colorado-Boulder and the Navrongo Health Research Centre. Protocols have been updated and approvals renewed annually.

### Specific Objectives:

The major project objectives that were met during this period include:

- Deliver households' stove orders (P3 Bio and Gas) and complete collection of payments (P3 Bio)
- Install stove usage monitors and undertake air quality sampling
- Analyze currently available experimental data on stove orders
- Disseminate preliminary results at scientific meetings

- Collaborate with NHRC partner to prepare for endline survey

Referring to our list of major goals, the first 7 have been accomplished, and we are well on track to meet the remaining goals.

**Significant Results:** Preliminary analysis of the P3 Bio stove offer results indicates that willingness to pay (WTP) for combo of mid- and top-tier stoves is approximately 20% of annual expenditure. Households with peer exposure have lower demand for top-tier stove alone, but higher demand for combination; peer exposure also decreases price elasticity for top-tier stove but increases price elasticity for combo.

For the urban P3 Gas sample, our analysis of households' bids indicates that average willingness to pay for LPG stoves is close to their market value, but willingness to pay for the fuel component (including the cylinder, accessories, and fuel refills) is about a third of its market cost.

**Key outcomes or Other achievements:**

**\* What opportunities for training and professional development has the project provided?**

Graduate students and professional research assistants at all 3 collaborating US universities and the Ghana health research center have been involved in the project over the past year. (CU = University of Colorado Boulder, CSPH = Colorado School of Public Health, NCSU = North Carolina State University, NHRC = Navrongo Health Research Centre)

Mona Abdo (CSPH Epidemiology PhD student) assisted with survey and stove order data management and analysis.

Jessie Geer (CSPH Masters of Public Health student) assisted with literature review, data management, and preparation of the P3 Bio protocol manuscript.

Rex Alirigia (CU Environmental Studies Masters Student) was a member of the Ghana research team during the first year of the project. In August of 2018, he came to the US to join the CU team as a Masters student. His work on the project involved survey data management and analysis, and assistance with the stove use monitoring activities.

Evan Coffey (CU Mechanical Engineering Professional Research Assistant) has led emissions and exposure measurement activities. His role coordinating multiple activities for this project and its predecessor has earned him the (unofficial) title of "senior field engineer."

Elise Mesenbring (CU Mechanical Engineering MS Student) led stove testing activities, stove use monitoring protocol design, and time activity monitoring activities. She also assisted with survey design, implementation, and data processing.

The project was presented to NCSU graduate environmental economics seminar, and description of opportunities for graduate students to work on econometric analysis of project data in next year of project.

NHRC student survey enumerators were trained (including description of scientific rationale and approach for study) in preparation for endline survey in Year 4.

Additional impacts on training and human resource development are detailed in the Impacts section of this report.

**\* How have the results been disseminated to communities of interest?**

The project website has been updated with reports, relevant publications, and photos.

(<http://sciencepolicy.colorado.edu/p3cookstoves/>).

One paper has been published with results from the P3 Gas study's first phase (describing current LPG supply and demand in the district), and the study protocol paper for P3 Bio has been submitted for publication.

**\* What do you plan to do during the next reporting period to accomplish the goals?**

Finalize collection of payments for stove orders (& stove recovery / return of payments for households unable to complete).

Continued measurements of stove use (using electronic monitors), emissions, and exposure, will be collected periodically for a subset of participants; all participants will complete an endline survey in Sept-Dec 2018.

Clean, merge and analyze data from baseline, midline and endline surveys and stove orders and payment completions.

Clean, merge and analyze exposure, proximity, kitchen air quality and stove usage data insofar as comparing outcomes across intervention groups through modeling and understanding key linkages between human behavior and exposure.

P3 Bio and P3 Gas results papers will be presented at conferences and submitted for publication in the coming year.

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## Products

### Books

### Book Chapters

### Inventions

### Journals or Juried Conference Papers

Dalaba, M., R. Alirigia, E. Mesenbring, E. Coffey, Z. Brown, M. Hannigan, C. Wiedinmyer, A. Oduro, and K.L. Dickinson (2018). Liquefied petroleum gas (LPG) supply and demand for cooking in Northern Ghana. *EcoHealth*. . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: 10.1007/s10393-018-1351-4

Dickinson, K.L., M. Dalaba, Z. Brown, R. Alirigia\*, E. Coffey, E. Mesenbring, M. Achazanaga, D. Agao, M. Ali, E. Kanyomse, J. Awaregya, C.A. Adagera, J.B. Aburiya, B. Gubilla, A.R. Oduro, and M. Hannigan. (). Prices, Peers, and Perceptions (P3): Study protocol for improved biomass cookstove project in Northern Ghana. *BMC Public Health*. . Status = SUBMITTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

### Licenses

### Other Conference Presentations / Papers

K.L. Dickinson, M. Dalaba, R. Alirigia, E. Coffey, Z. Brown, M. Hannigan and A. Oduro. (2018). *Economic experiments to measure LPG stove demand and impacts on cooking behaviors and exposures in Northern Ghana*. International Society for Environmental Epidemiology/ International Society for Exposure Science Annual Meeting. Ottawa, Canada. Status = OTHER; Acknowledgement of Federal Support = Yes

K.L. Dickinson, Z. Brown, M. Dalaba, R. Alirigia, E. Coffey, E. Mesenbring, D. Agao, M. Hannigan, A.R. Oduro (2018). *Prices, Peers, and Perceptions: Improved Cookstove Research in Northern Ghana*.. World Congress of Environmental and Resource Economics. Gothenberg, Sweden. Status = OTHER; Acknowledgement of Federal Support = Yes

### Other Products

### Other Publications

### Patents

### Technologies or Techniques

### Thesis/Dissertations

### Websites

*Prices, Peers, and Perceptions: Improved Cookstove Research in Northern Ghana*  
<http://sciencepolicy.colorado.edu/p3cookstoves/>

Provides information about the P3 project, including information about the study team, links to reports and publications, and photos from our field work.

### Supporting Files

<b>Filename</b>	<b>Description</b>	<b>Uploaded By</b>	<b>Uploaded On</b>
Dalaba_et_al-2018-EcoHealth.pdf	Dalaba et al EcoHealth 2018	Katherine Dickinson	08/29/2018
P3 bio protocol_final_r2.pdf	P3 Bio Protocol submitted to BMC Public Health	Katherine Dickinson	08/29/2018
ISEE Aug 18.pdf	Presentation at 2018 ISEE meeting in Ottawa	Katherine Dickinson	08/29/2018
P3 WCERE 2018.pdf	Paper presented at WCERE in Sweden (2018)	Katherine Dickinson	08/29/2018

## Participants/Organizations

### What individuals have worked on the project?

<b>Name</b>	<b>Most Senior Project Role</b>	<b>Nearest Person Month Worked</b>
Dickinson, Katherine	PD/PI	4
Dalaba, Maxwell	Co-Investigator	6
Hannigan, Michael	Co-Investigator	1
Kanyomse, Ernest	Co-Investigator	1
Oduro, Abraham	Co-Investigator	1
Coffey, Evan	Other Professional	6
Alirigia, Rex	Graduate Student (research assistant)	6
Mesenbring, Elise	Graduate Student (research assistant)	5
Aduah, Wisdom	Non-Student Research Assistant	11
Agao, Desmond	Non-Student Research Assistant	12
Alhassan, Razak	Non-Student Research Assistant	11
Ali, Moro	Non-Student Research Assistant	3
Ayileoh, Norbert	Non-Student Research Assistant	11
Wangara, Edwin	Non-Student Research Assistant	11

### Full details of individuals who have worked on the project:

**Katherine L Dickinson**

**Email:** katherine.dickinson@ucdenver.edu

**Most Senior Project Role:** PD/PI

**Nearest Person Month Worked:** 4

**Contribution to the Project:** Leads project, coordinates collaboration among project team members, leads experimental design and social survey data collection and analysis, advises and mentors RAs

**Funding Support:** N/A

**International Collaboration:** No

**International Travel:** Yes, Ghana - 0 years, 0 months, 9 days; Sweden - 0 years, 0 months, 7 days; Canada - 0 years, 0 months, 5 days

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**Maxwell Ayindenaba Dalaba**

**Email:** madalaba@yahoo.com

**Most Senior Project Role:** Co-Investigator

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Oversaw project design, stove interventions, data collection, analysis, and dissemination, including public engagement and outreach

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana

**International Travel:** Yes, Sweden - 0 years, 0 months, 6 days

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**Michael Hannigan**

**Email:** hannigan@colorado.edu

**Most Senior Project Role:** Co-Investigator

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Oversaw stove use and exposure monitoring work

**Funding Support:** NA

**International Collaboration:** No

**International Travel:** No

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**Ernest Kanyomse**

**Email:** Ernest.KANYOMSE@navrongo-hrc.org

**Most Senior Project Role:** Co-Investigator

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Assisted with day-to-day field operations

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana

**International Travel:** No

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**Abraham Rexford Oduro**

**Email:** Abraham.Oduro@navrongo-hrc.org

**Most Senior Project Role:** Co-Investigator

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Directed the field activities and project operations

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana

**International Travel:** No

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**Evan Coffey**

**Email:** Evan.Coffey@colorado.edu

**Most Senior Project Role:** Other Professional

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Led stove use monitoring and exposure data collection and analysis

**Funding Support:** University of Colorado Boulder Mechanical Engineering departmental funds

**International Collaboration:** No

**International Travel:** Yes, Ghana - 0 years, 0 months, 14 days

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**Rex Alirigia**

**Email:** rex.alirigia@colorado.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Assisted with data collection and data management

**Funding Support:** NA

**International Collaboration:** No

**International Travel:** Yes, Ghana - 0 years, 3 months, 0 days

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**Elise Mesenbring**

**Email:** elise.mesenbring@colorado.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 5

**Contribution to the Project:** Developed and oversaw stove use monitoring protocols

**Funding Support:** NA

**International Collaboration:** No

**International Travel:** No

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**Wisdom Aduah**

**Email:** aduahanaphase@gmail.com

**Most Senior Project Role:** Non-Student Research Assistant

**Nearest Person Month Worked:** 11

**Contribution to the Project:** Participated in Stove Use Monitor (SUM) data collection and household air quality data collection

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana

**International Travel:** No

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**Desmond Agao**



**Email:** Desmond.Agao@navrongo-hrc.org  
**Most Senior Project Role:** Non-Student Research Assistant  
**Nearest Person Month Worked:** 12

**Contribution to the Project:** Participated in data collection and assisted with day-to-day field operations

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana  
**International Travel:** No

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**Razak Alhassan**

**Email:** alhassanrazak1990@gmail.com  
**Most Senior Project Role:** Non-Student Research Assistant  
**Nearest Person Month Worked:** 11

**Contribution to the Project:** Participated in Stove Use Monitor (SUM) data collection and household air quality data collection

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana  
**International Travel:** No

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**Moro Ali**

**Email:** moro.ali91@gmail.com  
**Most Senior Project Role:** Non-Student Research Assistant  
**Nearest Person Month Worked:** 3

**Contribution to the Project:** Participated in data collection and assisted with day-to-day field operations

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana  
**International Travel:** No

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**Norbert Ayamba Ayileoh**

**Email:** Norbert.Ayileoh@navrongo-hrc.org  
**Most Senior Project Role:** Non-Student Research Assistant  
**Nearest Person Month Worked:** 11

**Contribution to the Project:** Participated in Stove Use Monitor (SUM) data collection and household air quality data collection

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana  
**International Travel:** No

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**Edwin Wangara**

**Email:** Edwin.Wangara@navrongo-hrc.org  
**Most Senior Project Role:** Non-Student Research Assistant  
**Nearest Person Month Worked:** 11

**Contribution to the Project:** Participated in Stove Use Monitor (SUM) data collection and household air quality data collection

**Funding Support:** NIH Clean Cooking Implementation Science Network grant

**International Collaboration:** Yes, Ghana

**International Travel:** No

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### What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Navrongo Health Research Centre	State or Local Government	Navrongo, Ghana
North Carolina State University	Academic Institution	Raleigh, NC
Organisation for Indigenous Initiatives and Sustainability	Other Nonprofits	Ghana
University of Colorado Boulder	Academic Institution	Boulder, CO

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### Full details of organizations that have been involved as partners:

#### Navrongo Health Research Centre

**Organization Type:** State or Local Government

**Organization Location:** Navrongo, Ghana

**Partner's Contribution to the Project:**

Facilities

Collaborative Research

**More Detail on Partner and Contribution:** NHRC staff lead fieldwork and data collection efforts.

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#### North Carolina State University

**Organization Type:** Academic Institution

**Organization Location:** Raleigh, NC

**Partner's Contribution to the Project:**

Collaborative Research

**More Detail on Partner and Contribution:** Co-PI Dr. Zachary Brown has led experimental design and econometric analysis of improved cookstove demand. He has also contributed to the design of the interventions studied in both the P3 Gas and P3 Bio projects, as well as in establishment of the survey data collection and inter-institutional transfer protocols.

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#### Organisation for Indigenous Initiatives and Sustainability

**Organization Type:** Other Nonprofits

**Organization Location:** Ghana

**Partner's Contribution to the Project:**

Collaborative Research

**More Detail on Partner and Contribution:** This Ghanaian non-governmental organization (NGO) has led the implementation of the interventions for P3 Bio and P3 Gas. They have organized and led community meetings to introduce participants to the different types of stoves, have made stove offers to participant, and have delivered stoves and collected payments. They have also dealt with stove maintenance needs.

## University of Colorado Boulder

**Organization Type:** Academic Institution

**Organization Location:** Boulder, CO

### Partner's Contribution to the Project:

In-Kind Support

Facilities

Collaborative Research

**More Detail on Partner and Contribution:** Co-PI Hannigan and other key personnel direct monitoring and outcome measurement components of the project.

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### What other collaborators or contacts have been involved?

NIH Clean Cooking Implementation Science Network: This organization is funding a companion project examining adoption of liquefied petroleum gas (LPG) stoves in the study area. Several aspects of this project, including the teams involved, research questions, and outreach activities, are shared across the two projects. Meetings hosted by the ISN, including a workshop in Bethesda in May 2016, provide opportunities to disseminate project results and foster new collaborations.

CoCubed: The Colorado Cookstove Collaborative was founded by PI Dickinson to provide a forum for sharing research methods and results among various teams along Colorado's Front Range engaged in cookstove projects around the world.

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## Impacts

### What is the impact on the development of the principal discipline(s) of the project?

The effects of social interactions on the adoption of new technologies remains a core area of research in microeconomics, and associated subfields like development and environmental economics. The unique empirical approach of this study, comparing the demand for cookstoves between a group exposed indirectly in a prior experiment with free distribution of the technology and group that had never seen the technology, constitutes its major scientific contribution.

### What is the impact on other disciplines?

Much engineering research on clean biomass cookstoves focuses on improving stoves' efficiency and affordability, but does not typically consider marketing and target users' economic demand for these products. This project shows how economic factors and broader market considerations (e.g. the availability of complementary stoves that can be bundled in the market place) relate to engineering considerations.

### What is the impact on the development of human resources?

This study is developing human resources through opportunities for education and training of several early career engineers and scientists at each of the participating institutions (CU-Boulder, NHRC, NCSU). Graduate students Elise Mesenbring, Rex Alirigia, and David Pfothauer, and PRA Evan Coffey have received substantial training in project development and execution. The cross disciplinary nature of P3 has changed the way that the engineering students and staff think about technology development; they are learning and thinking about the many economic and social factors that impact technology use and adoption. The engineers really value this aspect of their development.

PI Dickinson obtained a faculty (Assistant Professor) position in the Department of Environmental and Occupational Health in the Colorado School of Public Health. Her experience as PI of this large NSF grant was a strong selling point for her qualifications and potential success in this position.

Co-PI Brown, an early career applied economist at NCSU, successfully completed his midterm tenure review in 2016/2017. This award, and the ongoing research, was a significant accomplishment on his dossier, and adds to his expertise and research portfolio in development economics and technology adoption. The project also provides significant experience to PhD student Lee Parton, applying his GIS skills to development economics, a new research area for him.

The project has provided significant opportunities for training and capacity building for NHRC researchers. The project provided opportunities for two of the project staff (Rex Alirigia and Moro Ali) to pursue further education. Thus, based in part on the experience gained from the project, in August 2017, Rex Alirigia gained an admission into the University of Colorado, Boulder to pursue a M.Sc. in Environmental Studies. Also, in August 2017, Moro Ali was accepted into the Kwame Nkrumah University of Science and Technology, Ghana, to pursue an MPhil in Environmental science. The topics for their theses are related to the P3 project.

For Dr. Dalaba, the project coordinator at the NHRC, this project has improved his knowledge in his field of health economics. He has gained better understanding of how economic incentives such as prices influence cookstove adoption and improved health status. In addition the project has strengthened his knowledge and skills in collecting data on willingness to pay, project coordination as well as improved his knowledge in environmental health.

**What is the impact on physical resources that form infrastructure?**

Nothing to report.

**What is the impact on institutional resources that form infrastructure?**

Nothing to report.

**What is the impact on information resources that form infrastructure?**

Nothing to report.

**What is the impact on technology transfer?**

Nothing to report.

**What is the impact on society beyond science and technology?**

It is envisioned that potential users of improved cookstoves (most directly, women who are the predominant households in much of the developing world), entrepreneurs, NGOs, as well as stove designers will benefit from tangible information on how much households are willing to pay for these new technologies, as well as potential factors to consider in designing new models of stoves.

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## Changes/Problems

**Changes in approach and reason for change**

Nothing to report.

**Actual or Anticipated problems or delays and actions or plans to resolve them**

Nothing to report.

**Changes that have a significant impact on expenditures**

Nothing to report.

**Significant changes in use or care of human subjects**

Nothing to report.

**Significant changes in use or care of vertebrate animals**

Nothing to report.

**Significant changes in use or care of biohazards**

Nothing to report.